

Report of the 3rd IOTC Technical Committee on Management Procedures

Hyderabad, India, 14–15 June 2019

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ACRONYMS

BET	Bigeye Tuna
BMSY	Biomass that achieves maximum sustainable yield
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
CPCs	Contracting parties and cooperating non-contracting parties
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FAO	Food and Agriculture Organization of the United Nations
IOTC	Indian Ocean Tuna Commission
MP	Management Procedure
MPD	Management Procedures Dialogue
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
SC	Scientific Committee, of the IOTC
SSB	Spawning stock biomass
SPC	Secretariat of the Pacific Community
tRFMO	tuna Regional Fisheries Management Organization
TAC	Total Allowable Catch
TCMP	Technical Committee on Management Procedures
WP	Working Party of the IOTC
WPB	Working Party on Billfish of the IOTC
WPEB	Working Party on Ecosystems and Bycatch of the IOTC
WPM	Working Party on Methods of the IOTC
WPNT	Working Party on Neritic Tunas of the IOTC
WPDCS	Working Party on Data Collection and Statistics of the IOTC
WPTmT	Working Party on Temperate Tunas of the IOTC
WPTT	Working Party on Tropical Tunas of the IOTC
YFT	Yellowfin Tuna

STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in [Appendix IV](#) and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

Level 1: From a subsidiary body of the Commission to the next level in the structure of the Commission:

RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:

REQUESTED: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalise the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: General terms to be used for consistency:

AGREED: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.

NOTED/NOTING: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader of an IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED; URGED; ACKNOWLEDGED**).

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EXECUTIVE SUMMARY

The Indian Ocean Tuna Commission has established a dedicated Technical Committee of Management Procedures (TCMP) as a formal communication channel between science and management to enhance decision-making response of the commission in relation to Management Procedures (MPs). The third session of the TCMP of the Indian Ocean Tuna Commission was held in Hyderabad, India June 14 –15, 2019. The TCMP provided a forum for identifying and evaluating Management Procedures for key IOTC species, including standardising the presentation of Management Strategy Evaluation (MSE) results to facilitate the exchange of information and views between fishery scientists and managers, and discussions on elements of Management Procedures that require a decision by the Commission.

- The TCMP **NOTED** the Operating Models (OM) based on the 2016 WPTmT stock assessment, with data until 2014, and that there is a plan for a new stock assessment for albacore in 2019. The results of the new assessment in 2019 might require, if the results are outside the bounds of the current OM, to recondition the OM and to repeat the simulation of the Management Procedures based on the new OM. The **TCMP REQUESTED** WPM and Scientific Committee to review the results of the 2019 Albacore assessment and discuss on the need, or not, of reconditioning the OM and repeat the simulations of the Management Procedures based on the new OM, depending on the stock assessment results.
- The TCMP **NOTED** that the desired Management Procedure (MP) would be one that recovers the stock and keeps it around the target. Most of the MPs tested to date tend to overshoot the target. This may be because the MPs are too simple or the data not sufficiently informative. Additional complexity could be added to the MP design but it is difficult to design a single MP that will achieve the desired MP behaviour with certainty. Another option would be to develop one MP for rebuilding and another one for the time that stock is recovered. The TCMP **AGREED** to develop an MP for the rebuilding period, which will be updated once recovery is achieved, but the TCMP also **REQUESTED** that performance statistics are shown for the two periods: tuning objective recovery period, and the 20 years projected period when tuning to the recovery target.
- The TCMP **REQUESTED** that the first rebuilding time period (5 years) is not used as a tuning objective and instead, 10 and 15 year recovery objectives are used for tuning (Y2 and Y3).
- The TCMP also **REQUESTED** results that demonstrate how long rebuilding will take if TAC change constraints are limited to 15% (and alternative options of TAC change constraints such as 10% and 20% with some flexibility on the values for the technical developing team).
- The TCMP **REQUESTED** the Scientific Committee to develop a revised workplan for Management Procedure development as the current plan is due to expire in 2020.
- The TCMP **RECOMMENDED** that the TCMP should continue to function in order to progress on MSE matters and advise on these issues to the Commission.
- The TCMP **REQUESTED** that Intersessional capacity building on MSE be conducted. Additionally attendance at the IOTC Working Party on Methods by national scientists will facilitate the increased understanding of the MSE processes by all CPCs.
- The TCMP **ENCOURAGED** that the deadline for the submission of documents for the TCMP be extended to one month to allow participants to fully consider the information prior to the onset of the meeting. The TCMP also **REQUESTED** that the questions that require decisions for the progress of the MPs for each species, be distributed prior to the meeting.
- The TCMP **REQUESTED** that a “shiny app” such as that demonstrated during the meeting be developed specifically for the IOTC.

1. OPENING OF THE SESSION AND ARRANGEMENTS

1. The third Technical Committee on Management Procedures meeting was held on the 14–15 June 2019, in Hyderabad, India.
2. Dr. Hilario Murua, the Chair of the Scientific Committee, opened the meeting and welcomed attendees. Dr. Hilario Murua emphasized the importance of a formal forum for engaging both scientists and decision makers in the process of developing Management Procedures for key IOTC species.
3. The meeting was facilitated by Dr. Graham Pilling (SPC), who welcomed 65 delegates from 24 Contracting Parties of the Commission, 2 delegates from 1 Cooperating Non-Contracting Party and 9 Observers (including one invited expert) to the session. The list of participants is provided in Appendix I.

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

4. The Scientific Committee Chair **NOTED** that the TCMP was established to enhance the effective communication and mutual understanding between science and management, and to facilitate decision-making response of the commission on matters related to management procedures. To this aim, scientists presented progress in developing and evaluating management procedures for the key tuna stocks in the Indian Ocean, in accordance with the decision framework as prescribed in Resolution 15/10 and associated workplan agreed by the Commission.
5. The adopted agenda for the meeting is presented in Appendix II. The documents presented to the TCMP are listed in Appendix III.

3. ADMISSION OF OBSERVERS

6. The TCMP **NOTED** that the applications by new Observers should continue to follow the procedure as outlined in Rule XIV of the IOTC Rules of Procedure (2014).

3.1 INTERGOVERNMENTAL ORGANISATIONS (IGO)

7. In accordance with Rule VI.1 and XIV.4 of the IOTC Rules of Procedure (2014), the TCMP **ADMITTED** the following Inter-governmental organisations (IGO) as observers to the 3rd Session of the TCMP.
 - Food and Agriculture Organization of the United Nations (FAO)
 - Indian Ocean Commission (IOC)

3.2 MEMBERS AND ASSOCIATE MEMBERS OF THE ORGANIZATION THAT ARE NOT MEMBERS OF THE COMMISSION

8. In accordance with Rule VI.2 and XIV.4 of the IOTC Rules of Procedure (2014), the TCMP **ADMITTED** the following Members and associated members of the organization that are not members of the commission as observers to the 3rd Session of the TCMP
 - United States Of America
 - Curacao

3.3 NON-GOVERNMENTAL ORGANISATIONS (NGO)

9. In accordance with Rule VI.1 and XIV.5 of the IOTC Rules of Procedure (2014), the TCMP **ADMITTED** the following Non-governmental organisations (NGO) as observers to the 3rd Session of the TCMP.
 - International Seafood Sustainability Foundation (ISSF)
 - The Pew Charitable Trusts (PEW)

3.4 INVITED EXPERTS

10. In accordance with Rules VI.1 and XIV.9 of the IOTC Rules of Procedure (2014), the Commission may invite

consultants or experts, in their individual capacity, to attend the meetings or participate in the work of the Commission as well as the Scientific Committee and the other subsidiary bodies of the Commission. The TCMP **ADMITTED** the following invited experts as observers to the 3rd Session of the TCMP.

- Taiwan, Province of China

4. DECISIONS OF THE COMMISSION RELATED TO THE WORK OF THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES

4.1 RESOLUTION 16/09 – TERMS OF REFERENCE

11. The TCMP **NOTED** paper IOTC–2019–TCMP04–03 which outlined the objectives, tasks and priorities of the Technical Committee on Management Procedures as established by the Commission through Resolution 16/09. This Resolution calls for the TCMP to focus on the presentation of results and exchange of information, and to emphasize the aspects of the Management Strategy Evaluation process that require a decision by the Commission, when undertaking the evaluation and discussion of management procedures for the IOTC fisheries.

4.2 OUTCOMES OF THE 2ND SESSION OF TCMP

12. The TCMP **NOTED** paper IOTC–2019–TCMP03–04 which summarised the main outcomes of the 2nd Technical Committee on Management Procedures. The Chair Report of the 2nd TCMP provided the recommendations as below:

- *The TCMP **AGREED** that the definition of stock status is a complex issue and **RECOMMENDED** discussions on potential refinements to the KOBE plots and definitions of “overfished” and “overfishing” in relation to target and limit reference points to be conducted in collaboration with other t-RFMO, ideally through the KOBE process. The TCMP **RECOMMENDED** that this issue is also discussed within the SC.*
- *The TCMP **RECOMMENDED** that the longline CPUE data be available and joint standardization be conducted in the future to support the MP (CPUE-based and model based) for different stocks on which these data are critical (ALB, BET, YFT, SWO).*
- *For Albacore tuna, the TCMP **RECOMMENDED** that the MSE continue to investigate the technical issues identified during discussions.*
- *For Yellowfin tuna, the TCMP **RECOMMENDED** that the MSE retain tuning objective TY 5, as well as examine a number of alternative simulation/projection timeframe (to rebuilding targets at 2024, 2029 and 2034).*
- *The TCMP **RECOMMENDED** a revised set of tuning objectives based on TB2, TB3, TB4 that is calculated over 2030-2034.*
- *The TCMP **RECOMMENDED** that Commission considers reviewing the budget for 2019 adopted by SCAF to include the work of MSE provided that total budget approved by SCAF is not increased.*
- *The TCMP **RECOMMENDED** that SC identify the budget related to the progress on MP/MSE work for all species in its report so as SCAF can review to include in Commission regular budget to complete the workplan on MSE agreed by the Commission in 2017.*

4.3 OUTCOMES OF THE 22ND SESSION OF THE COMMISSION MEETING

13. The TCMP **NOTED** paper IOTC–2019–TCMP03–05 which outlined the main outcomes of previous sessions of the Commission, specifically related to the work of the TCMP and **AGREED** to consider, throughout the course of the current meeting, how best to provide the Scientific Committee with the information it needs in order to satisfy the Commission’s requests.

4.4 OUTCOMES OF THE 21ST SESSION OF THE SCIENTIFIC COMMITTEE

14. The TCMP **NOTED** paper IOTC–2019– TCMP03–06 which outlined the main outcomes of 21st Session of the Scientific Committee that specifically related to the work of the TCMP.

5. OVERVIEW OF THE EVALUATION OF MANAGEMENT PROCEDURES IN THE IOTC

5.1 THE IOTC PROCESS ON ADOPTION OF MANAGEMENT PROCEDURES (INCLUDING THE RESOLUTION 15/10 OF THE MANAGEMENT FRAMEWORK).

15. The Chair of the Scientific Committee provided a review of the Management Procedures process in IOTC as well as different resolutions adopted by IOTC in relation to Management Procedures.

5.2 MANAGEMENT PROCEDURES AND MSE:

16. The TCMP **NOTED** that the presentations where the timeline of actions to date, the basic principles and concepts of MSE were described in detail including the objectives, timeframes, and probabilities, and noted the presentation for MSE results.

17. TCMP **NOTED** the complexity of the issues discussed and **AGREED** that this review was very useful for the TCMP to clarify the key issues in the Management Strategy Evaluation (MSE) process, and how it is being addressed for IOTC stocks.

18. The TCMP **NOTED** the key issues to consider and which require feedback to the Scientific Committee.

19. The TCMP **RECALLED** that the Kobe plot should be presented in a standardised format. This particularly relates to the colours used for the Kobe plot quadrants.

5.3 SC PROPOSAL FOR THE STANDARD PRESENTATION OF MSE RESULTS

20. The TCMP **NOTED** that further discussions and proposals were made on the standard format for presenting the MSE results. The TCMP **AGREED** that consistent communication of Management Strategy Evaluation results through standardised terminology and presentation formats is effective to help decision makers to better understand the likely performance of different Management Procedures or harvest control rules (HCR) against management objectives.

21. The TCMP **NOTED** the need to make the figures for presenting results as clear and well labelled as possible to ensure the information conveyed in the figures is clearly understood.

6. HANDS-ON WORKSHOP – DEMONSTRATION OF MSE TOOL

6.1 DEMONSTRATION OF MSE TOOL AND QUESTIONNAIRE

22. The TCMP **PARTICIPATED** in a hypothetical Management Procedure evaluation exercise to compare Management Procedures performance trade-offs. The exercise was undertaken with a web-based application designed for WCPFC capacity building. Participants were asked to choose a Management Procedure and explain why it was preferable from the perspectives of fisheries managers, NGOs or the fishing industry.

23. The TCMP **PARTICIPATED** in an anonymous, web-based survey to provide feedback about the general understanding of the IOTC Management Procedure process and personal priorities among management objectives. The questionnaire is provided in Appendix IV. The TCMP **AGREED** that the survey was useful but must not be interpreted as a formal TCMP result because the participation was not representative of the Commission CPCs.

24. The TCMP **SUGGESTED** that additional interactive exercises should be undertaken in future TCMP meetings to increase understanding of the MP process and to provide MP developers with informal feedback on management priorities.

7. STATUS OF THE MANAGEMENT PROCEDURE EVALUATION/OPERATING MODELS

7.1 ALBACORE TUNA

25. The TCMP **NOTED** document IOTC–2019–TCMP03–09 regarding a Status Report for the Indian Ocean Albacore Tuna Management Procedures Evaluation.

26. The TCMP **NOTED** the Operating Models (OM) based on the 2016 WPTmT stock assessment, with data until 2014, and that there is a plan for a new stock assessment for albacore in 2019. The results of the new assessment in 2019 might require, if the results are outside the bounds of the current OM, to recondition the OM and to repeat the simulation of the Management Procedures based on the new OM. The **TCMP REQUESTED** WPM and SC to review

the results of the 2019 Albacore assessment and discuss on the need, or not, of reconditioning the OMs and repeat the simulations of the Management Procedures based on the new OM, depending on the stock assessment results.

27. The TCMP **THANKED** the scientists involved for this work and encouraged the continuation of this analysis with a view of receiving an updated set of results next year.
28. The TCMP **NOTED** that the Management Procedure implementation lag tested for this stock is three years, because the assessment of this stock is carried out early in the year and usually the data for the last year is not available for the stock assessment (.e. stock assessment in 2019 is using data up to 2017) and **ENCOURAGED** Commission and SC to find possible means to reduce this time lag to 2 years as it is the case of other species. The TCMP **REQUESTED** the SC to evaluate through simulations the likely impact of such a change in procedure on the performance of candidate MPs.
29. The TCMP **NOTED** again as last year that the performance of MPs is driven more by the tuning objectives (Appendix V) than by the functional form of the MP (CPUE-based and model based). However, the TCMP **NOTED** that the performance of the CPUE based Management Procedures are poorer than the model based and, hence, TCMP suggested, as a possibility to reduce the workload and tuning objectives, to focus on the model based MPs. Nevertheless, the TCMP was informed that it could be too early to dismiss the CPUE based Management Procedures because the robustness tests have not been done yet. Once the results of those robustness tests are analysed it could be possible to discard one type of MPs based on their performance and thus reduce the number of MPs to be tested.
30. The TCMP **NOTED** that the presented MSE has examined CPUE-based and model-based MPs, with additional characteristics, including a 3-year TAC setting, 15% TAC change constraint and a 3 year implementation lag. The tuning objectives considered were those by TCMP01 and repeated by TCMP02.
31. The TCMP03 **AGREED**, that a shorter time period for the calculation of tuning objectives, 2030-34 be used. This, as explained to TCMP03, avoids the range of stocks above the tuning levels being drive down to achive those objectives over the whole simulation period. The TCMP **NOTED** that the tuning criteria of $SSB > SSB_{MSY}$ with a 50% probability requires to increase the current catches by 15-25% and will have a higher probability ofr the stock breaching the limit reference point while, for the CPUE based MP, overfishing would be occurring as $F > F_{MSY}$; which may suggest that this tuning criteria is not precautionary. The TCMP also **NOTED** that status-quo catches will be maintained in the future when MPs with tuning criteria of being in Green quadrant with 60% and 75% probability, although in the latter case a small catch reduction would be required.
32. The TCMP **AGREED** to reduce the tuning criteria for the next iteration to 3 items, by excluding the tuning criteria of $SSB \geq SSB_{MSY}$ with a probability of 50 % (TA1).

7.2 BIGEYE TUNA

33. The TCMP **NOTED** document IOTC–2019–TCMP03–10 which provided an update to the IOTC Bigeye Tuna Management Procedure Evaluation.
34. The TCMP **NOTED** that several generic MPs have been evaluated for each of the tuning objectives (Appendix V) requested by the TCMP-02 (2018). A small subset was presented to illustrate typical performance.
35. The TCMP **NOTED** that the main feedback priority for the TCMP03 is to refine management objectives and MP tuning targets.
36. The TCMP **SUGGESTED** that the B1 tuning objective could be removed from the next iteration of MP evaluations (unless the 2019 stock assessment substantially changes the perception of the fishery relative to the 2016 assessment and current Operating Model). The justification included:
- B1 represents a substantially higher risk of exceeding SB reference points than B2 and B3.
 - Achieving the B1 tuning requires a substantial increase in average catches in the short term. This does

not appear to be desirable for industry at present, because catches have been declining in recent years, despite the perception of healthy stock status.

7.3 YELLOWFIN TUNA

37. The TCMP **NOTED** that the operating model (OM) updates to 2019 yield more pessimistic OMs than those resulting from 2018 stock assessment. Also, the TCMP **NOTED** that the yellowfin stock assessment is undergoing a review in 2019 and the OMs may change significantly from the current grid.
38. The TCMP **NOTED** the different tuning objectives (Appendix V) used in the yellowfin MSE and that none was achievable with the initial stability request of 15% change in TAC. This condition was relaxed to achieve the tuning objectives agreed in TCMP02.
39. The TCMP **NOTED** that most MPs would recover the stock to levels well above the target biomass, beyond the timeframe in which the target is to be achieved. TCMP **NOTED** that faster rebuilding requires larger reduction in fishing mortality and catch. The TCMP also **NOTED** that there were differences on the performances of the MP tested for the same tuning objective.
40. The TCMP **NOTED** that the desired Management Procedure (MP) would be one that recovers the stock and keeps it around the target. Most of the MPs tested to date tend to overshoot the target. This may be because the MPs are too simple or the data not sufficiently informative. Additional complexity could be added to the MP design but it is difficult to design a single MP that will achieve the desired MP behaviour with certainty. Another option would be to develop one MP for rebuilding and another one for the time that stock is recovered. The TCMP **AGREED** to develop an MP for the rebuilding period, which will be updated once recovery is achieved, but the TCMP also **REQUESTED** that performance statistics are shown for the two periods: tuning objective recovery period, and the 20 years projected period when tuning to the recovery target.
41. The TCMP **NOTED** that rebuilding the stock in less than 10 years would have notable disruptions for the industry in the short term. The TCMP **NOTED** that drastic reductions of catch could have a negative effect on the quality of the CPUE needed for a correct functioning of the MP (due to a contraction of longline fishing effort in space and time). The TCMP also **NOTED** that those reductions may change the selectivity of the fisheries which is not taken into account in the current Operating Models. Also, the TCMP **NOTED** that additional changes to the Management Procedure could include changing the frequency of quota setting, changing TAC change constraints and adding an implementation lag.
42. The TCMP **NOTED** that the current Operating Model seems to be “too pessimistic”, probably because it relies in a CPUE that cannot be reconciled with the catch observations. This is something that is causing fundamental problems in the stock assessment too and it is the reason for the 2019 review of the stock assessment model.
43. The TCMP **NOTED** that it is impossible to predict the impact of the 2019 review of the yellowfin stock assessment model or the operating model used in the MSE.
44. The TCMP **NOTED** that it seems that the model-based MPs work better, probably because they include insights on the productivity and dynamics of the stock. The model-based component of the Management Procedures under development are centred on the biomass production model; the TCMP **SUGGESTED** that the possibility of using non-equilibrium production models instead of stationary ones are discussed within the MSE technical group.
45. The TCMP **NOTED** similarities in the CCSBT and IOTC MSE processes, in terms of unexpected development delays due to model and data problems revealed during the MSE
46. The TCMP **REQUESTED** that the first rebuilding time period (5 years) is not used as a tuning objective and instead, 10 and 15 year recovery objectives are used for tuning (Y2 and Y3).
47. The TCMP also **REQUESTED** results that demonstrate how long rebuilding will take if TAC change constraints are limited to 15% (and alternative options of TAC change constraints such as 10% and 20% with some flexibility on the values for the technical developing team).

7.4 SKIPJACK TUNA

48. The TCMP **NOTED** that Resolution 16/02 requires to review through further Management Strategy Evaluation (MSE) by 2021 SKJ HCR. The TCMP noted that the idea is to extend the current status of the skipjack Harvest Control Rule

to a full Management Procedure. The TCMP was informed that funds have been secured and a contract is being negotiated for a consultant to take on this work, which should start over the next few months.

7.5 SWORDFISH

49. The TCMP **NOTED** IOTC–2019–TCMP03–12, which summarizes the progress on Indian Ocean swordfish Management Procedure development. An Operating Model has been developed based on the most recent stock assessment with uncertainty dimensions similar to the other IOTC species, but remains to be reviewed by the relevant technical bodies. Interim MP evaluation results were not presented. Ongoing funding is available for the work.

50. The TCMP **REQUESTED** results focusing on the three tuning objectives that were recommended for bigeye at TCMP02 (2018) (further **NOTING** that the MP developers may present additional tuning objectives if the range of performance does not appear to be sufficient):

- **S1:** Pr(Kobe green zone 2030:2034) = **0.5**
 - **S2:** Pr(Kobe green zone 2030:2034) = **0.6**
 - **S3:** Pr(Kobe green zone 2030:2034) = **0.7**
- Additional MP guidance included:
 - TAC setting every 3 years
 - 15% TAC change limits
 - 3 year lag between data and TAC implementation

8. FUTURE DIRECTION OF THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES

51. The TCMP **NOTED** a draft proposal introduced by Australia (IOTC-2019-S23-PropP) which will be presented to the Commission in 2019. The TCMP **RECOGNISED** that it is not anticipated this proposal will be adopted in 2019, but rather that it demonstrates the components that a future resolution will contain. The various parts of the proposal will require future discussion by the TCMP to finalise the details. The proponents stated that they would welcome any comment or suggestions regarding the proposal.

52. The TCMP expressed support for the presentation of this kind of draft proposal that can be discussed and refined for future adoption.

8.1 WORKPLAN

53. The TCMP **THANKED** the FAO-Common Oceans ABNJ Tuna project, EU and Australia for continuing to support the YFT, BET, SKJ, SWO and ALB MSE work.

54. The TCMP **NOTED** that the FAO-Common Oceans ABNJ Tuna project is due to finish in December 2019 but will continue to support MSE initiatives until that time. The second phase of the project will begin in 2021 and so there will be a gap in ABNJ support, but this should resume in the future.

55. The TCMP **REQUESTED** the Scientific Committee to develop a revised workplan for Management Procedure development as the current plan is due to expire in 2020.

8.2 PRIORITIES

56. The TCMP **NOTED** that in 2018, the Scientific Committee recommended to consider alternative formulations of the Kobe plot to indicate an appropriate buffer zone below BMSY to account for natural variations in biomass (**Figure 1**). This would include characterising stock status relative to limits rather than targets, including a buffer zone between the target and the limit reference point.

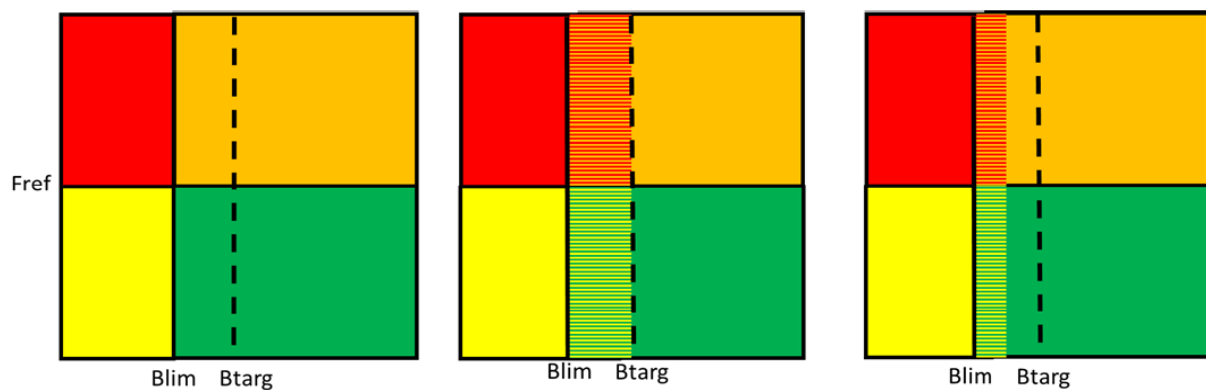


Fig. 1: Three examples of modified Kobe Plots in which there is a target biomass, B_{targ} , and a reference F (F_{ref}) such as F_{MSY} . In each plot, the red quadrant is based on biomass being below the limit (B_{lim}) rather than below a target biomass. The plot in the middle retains the four colours, but contains red-orange and yellow-green “buffer zones” between the target and limit. In the plot on the right, the buffer zone starts somewhat below the target biomass to account for natural fluctuations of the stock around the target. Note: This figure is from the ISSF Stock Assessment Workshop report (IOTC-2018-WPM09-INF06).

57. The TCMP **NOTED** that redefining the term overfished using the limit rather than the target could create conflicts with the usage of the term in other international fora. This would need to be taken into account in further discussions on this issue. It was stressed that the presentation of the results does not affect the management decisions that are or need to be taken.
58. For Stock status determination, the TCMP **NOTED** that although emphasis has been placed on the biomass reference point for indicating stock status, the F reference point is also important and should be presented along with the biomass reference point.
59. The TCMP **NOTED** that further discussion is required on this issue and that no consensus was reached at the current meeting. The TCMP **AGREED** that progress on this issue should continue intersessionally within a small working group and be presented to relevant working groups throughout the year with final presentation to the TCMP in 2020. Terms of reference for this group are provided in Appendix VI. These deliberations could then be used to revise Resolution 15/10.
60. The TCMP also **NOTED** that the Scientific Committee would need to evaluate the appropriateness of and provide further advice on the biomass limit reference points for each species, should this approach of characterising stock status be decided in the future.

8.3 PROCESS AND FUTURE MEETINGS OF TCMP

61. The TCMP **NOTED** that budget has been secured to continue the work on MSE in IOTC both through the regular IOTC budget as well as CPC contributions.
62. The TCMP **RECOMMENDED** that the TCMP should continue to function in order to progress on MSE matters and advise on these issues to the Commission.
63. The TCMP **AGREED** that the current format of the TCMP should continue (i.e. a two day meeting just prior to the Commission meeting). The TCMP encouraged further maximising the use of the available time and having a good representation of scientists and managers attending the meeting.
64. The TCMP **REQUESTED** that Intersessional capacity building on MSE be conducted. Additionally attendance at the IOTC Working Party on Methods by national scientists will facilitate the increased understanding of the MSE processes by all CPCs.
65. The TCMP **ENCOURAGED** that the deadline for the submission of documents for the TCMP be extended to one month to allow participants to fully consider the information prior to the onset of the meeting. The TCMP also **REQUESTED** that the questions that require decisions for the progress of the MPs for each species, be distributed prior to the meeting.
66. The TCMP **REQUESTED** that a “shiny app” such as that demonstrated during the meeting be developed specifically

for the IOTC.

APPENDIX I
LIST OF PARTICIPANTS

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APPENDIX II
AGENDA FOR 1ST IOTC TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURE

Date: 14–15 June 2019

Location: India

Venue: Novotel Hyderabad Convention Centre, Hyderabad, India

Time: 09:00 – 17:00

Chair: Hilario Murua (SC Chair)

Facilitator: Graham Pilling

1. OPENING OF THE SESSION AND ARRANGEMENTS (Co-Chairs)

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION (Chairpersons)

3. ADMISSION OF OBSERVERS (Chairpersons)

4. DECISIONS OF THE COMMISSION RELATED TO THE WORK OF THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES (IOTC Secretariat)

- 4.1 Resolution 16/09 – Terms of Reference
- 4.2 Outcomes of the 2nd Session of TCMP
- 4.3 Outcomes of the 22nd Session of the Commission meeting
- 4.4 Outcomes of the 21st Session of the Scientific Committee

5. OVERVIEW OF THE EVALUATION OF MANAGEMENT PROCEDURES IN THE IOTC (SC Chairperson) –

- 5.1 The IOTC Process on adoption of management procedures (Including the Resolution 15/10 of the Management Framework) (SC Chair).
- 5.2 Management Procedures and MSE:
- 5.3 SC proposal for the standard presentation of MSE results

6 HANDS-ON WORKSHOP – DEMONSTRATION OF MSE TOOL (Facilitator) -

- 6.1 Demonstration of MSE tool and questionnaire

7 STATUS OF THE MANAGEMENT PROCEDURE EVALUATION/OPERATING MODELS (Facilitators)

- 7.1 Albacore tuna (Iago Mosqueira, Vice-Chairperson of the WPM)
- 7.2 Bigeye tuna (Dale Kolody)
- 7.3 Yellowfin tunas (Dale Kolody)
- 7.4 Skipjack tuna (Hilario Murua, Chairperson of the SC)
- 7.5 Swordfish (Iago Mosqueira, Vice-Chairperson of the WPM)

8 FUTURE DIRECTION OF THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES (Chairpersons)

- 8.1 Workplan (Including new timelines/budget and resources needed)
- 8.2 Priorities
- 8.3 Process and future meetings of TCMP

19 of May Afternoon

9 ADOPTION OF REPORT (Chairpersons)

APPENDIX III
LIST OF DOCUMENTS

Document	Title
IOTC-2019-TCMP03-01a	Draft: Agenda of the 3 rd Technical Committee on Management Procedure Meeting
IOTC-2019-TCMP03-01b	Draft: Annotated agenda of the 3 rd Technical Committee on Management Procedure Meeting
IOTC-2019-TCMP03-02	Draft: List of documents of the 3 rd Technical Committee on Management Procedure (TCMP03)
IOTC-2019-TCMP03-03	IOTC Resolution 16/09
IOTC-2019-TCMP03-04	Outcomes of the 2 nd Technical Committee On Management Procedure
IOTC-2019-TCMP03-05	Outcomes of the 22 nd Session of the Commission
IOTC-2019-TCMP03-06	Outcomes of the 21 st Session of the Scientific Committee
IOTC-2019-TCMP03-09	Indian Ocean Albacore Tuna Management Procedures Evaluation: Status Report
IOTC-2019-TCMP03-10	IOTC Bigeye Tuna Management Procedure Evaluation Update June 2019
IOTC-2019-TCMP03-11	IOTC Yellowfin Tuna Management Procedure Evaluation Update June 2019
IOTC-2019-TCMP03-12	Indian Ocean Swordfish Management Procedure - Status Report

APPENDIX IV
INFORMAL TCMP QUESTIONNAIRE

1. What does Management Strategy Evaluation mean to you?

- A simulation framework to test defined Harvest Control Rules
- A simulation framework to model all components of the fishery management system
- A simulation framework to provide the best stock assessment
- I need more information

2. Which one of these definitions better explains to you what a Management Procedure is?

- The combination of pre-defined data, together with an algorithm to which such data are input to provide a value for a set of implementable management measures (or how/when to get to the target)
- A set of rules for CPCs to decide what to do
- A fixed catch ceiling that does not change every year
- A vision for where the fishery should be considering uncertainty

3. What is the difference between the IOTC skipjack Harvest Control Rule and a Management Procedure?

- They are equivalent
- A Management Procedure is a component of the Harvest Control Rule.
- The Harvest Control Rule requires consensus on the stock assessment results while in the MP these requirements are agreed in advance.

4. Please select your highest priority management objective.

- Maximize long-term catch
- Maximize long-term employment
- Maximize long-term profit
- Catch stability
- Minimize risk of spawning stock size going below the target Biomass level that achieves MSY
- Minimize chance of the stock size going below the level at which successful recruitment is compromised (i.e. a limit reference point, LRP).
- Minimize the impacts of fishing on the ecosystem

5. What would you consider to be an appropriate timeframe for recovery for an overexploited/overfishing stock

- As soon as possible
- 3 years
- 5 years
- years
- 15 years
- Option 6
- Depends on the species biology
- Should be decided case by case.

6. Do you consider that the management framework and operational objectives established in Resolution 15/10 are clear

- Yes, crystal clear
- No, there are many contradictions to be solved

- I think that the Resolution should be revisited
- I do not know

7. What is your interpretation of high probability in this case from Resolution 15/10: “For a stock where the assessed status places it within the lower right (green) quadrant of the Kobe Plot, aim to maintain the stock with a high probability within this quadrant”?

- 25%
- 50%
- 60%
- 90%

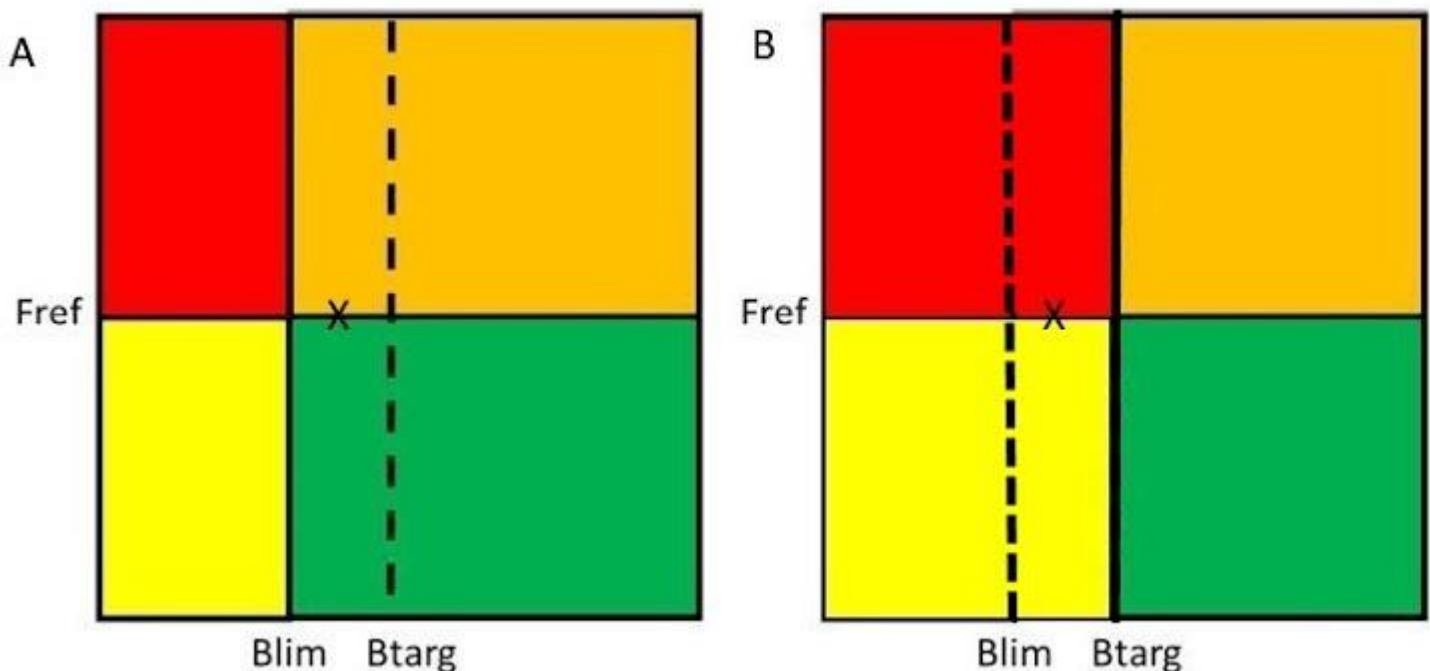
8. Do you think that the “high probability” is the same when related to achieving the targets or avoiding falling below the limits?

- Yes
- No
- There should be larger probability to achieve the targets than avoiding the limits
- There should be larger probability to avoid the limits than achieving targets

9. On average, the stock should be above B/BMSY and below F/FMSY what proportion of the time?

- 0 - 25%
- 25 - 50%
- Exactly 50%
- 50 - 75%
- 75 - 100%

10. Stock status - current stock is below Btarget, but above Blimit.



- Which of the figures above would you prefer to present the status of the stock (marked by the X)?
- Figure A (Stock is NOT considered overfished)
- Figure B (Stock is considered to be overfished)

APPENDIX V
TUNING OBJECTIVES USED FOR BIGEYE, YELLOWFIN, AND ALBACORE TUNA MSE

Bigeye tuna

- **B1:** $\Pr(\text{Kobe green zone } 2030:2034) = 0.5$. The stock status is in the Kobe green quadrant over the period 2030-2034 exactly 50% of the time (averaged over all simulations).
- **B2:** $\Pr(\text{Kobe green zone } 2030:2034) = 0.6$. The stock status is in the Kobe green quadrant over the period 2030-2034 exactly 60% of the time (averaged over all simulations).
- **B3:** $\Pr(\text{Kobe green zone } 2030:2034) = 0.7$. The stock status is in the Kobe green quadrant over the period 2030-2034 exactly 70% of the time (averaged over all simulations).

Yellowfin

- **Y1:** $\Pr(\text{SB}(2024) \geq \text{SB}(\text{MSY})) = 0.5$ (SB in 2024 exceeds SBMSY in exactly 50% of the simulations).
- **Y2:** $\Pr(\text{SB}(2029) \geq \text{SB}(\text{MSY})) = 0.5$ (SB in 2029 exceeds SBMSY in exactly 50% of the simulations).
- **Y3:** $\Pr(\text{SB}(2034) \geq \text{SB}(\text{MSY})) = 0.5$ (SB in 2034 exceeds SBMSY in exactly 50% of the simulations).

Albacore tuna

- **A1:** $\Pr(\text{mean}(\text{SB}(2019:2038)) \geq \text{SB}(\text{MSY})) = 0.5$. Average SB over the period 2019-2038 exceeds SB MSY in exactly 50% of the simulations).
- **A2:** $\Pr(\text{Kobe green zone } 2019:2038) = 0.5$. The stock status is in the Kobe green quadrant over the period 2019-2038 exactly 50% of the time (averaged over all simulations).
- **A3:** $\Pr(\text{Kobe green zone } 2019:2038) = 0.6$. The stock status is in the Kobe green quadrant over the period 2019-2038 exactly 60% of the time (averaged over all simulations).
- **A4:** $\Pr(\text{Kobe green zone } 2019:2038) = 0.7$. The stock status is in the Kobe green quadrant over the period 2019-2038 exactly 70% of the time (averaged over all simulations).

APPENDIX VI
TERMS OF REFERENCE FOR THE AD HOC REFERENCE POINT WORKING GROUP

An informal working group is established to consider and provide information to the TCMP on issues relating to the definition and presentation of stock status against conservation and management reference points, including but not limited to the following:

- the review of current (interim) reference points
- provide advice on possible revisions to Resolution 15/10 if required
- reporting stock status in relation to limit and target reference points
- suggestions on how to present stock status.

The working group, constituted preferentially by managers, scientists and relevant experts, will be convened by the Scientific Committee Chair and will conduct its work electronically. CPCs and accredited observers will provide focal contacts to the Chair

The matters to be considered by the Working Group will be presented in a draft working paper to be discussed at the relevant species working parties, WPM and SC, who will provide advice to the Working Group. This advice and any further considerations from the Working Group will be reflected in a working paper tabled for discussion at TCMP. Outcomes from TCMP discussions will be reported to the Commission.